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ABSTRACT

Based on individual efforts to establish qualitative criteria, perceptions about computer generated art as an art form within the broader range of traditional artistic expression are disjointed. The formalized, heuristic approach taken for this inquiry into the developing aesthetics of computer art consisted of an interactive survey known as the Delphi Procedure, which was used to engage a panel of experts in an interchange of views and to explore the various ideologies present in scholarly debate on this topic. Essentially a philosophical inquiry, this study explores the presence or absence of a "consensus doctorum" about the aesthetics of computer art. The international panel of experts surveyed included Charles Csuri, Frank Dietrich, Hiroshi Kawano, Monique Nahas, Mihai Nadin, Frieder Nake, Lillian Schwartz, and Gene Youngblood. The questionnaire and the complete text of the responses are included in the discussion. (Author/MES)

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EVOLVING AESTHETIC CRITERIA FOR COMPUTER GENERATED ART: A DELPHI STUDY

A Thesis

Presented in Partial Fulfillment of the Requirements

for the Degree Master of Arts in the

Graduate School of the Ohio State University

by

Richard Edward Lucas, B.F.A.

* * * * *

The Ohio State University

1986

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THESIS ABSTRACT

THE OHIO STATE UNIVERSITY

GRADUATE SCHOOL

NAME: Lucas, Richard, Edward

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DEGREE: Masters of Arts

ADVISER'S NAME: Linehan, Thomas, E.

TITLE OF THESIS: Evolving Aesthetic Criteria for Computer Generated Art: A Delphi Study

A state of disjointed perceptions about aesthetic evaluation exists concerning the rapidly growing field of computer generated art. These perceptions are based on individual efforts to establish qualitative criteria for this form of artistic endeavor.

This thesis investigates, by means of the Delphi prodedure, various ideologies present in aesthetic debate relative to computer art. Essentially a philosophical inquiry employing an interactive survey technique, this study explores the presence or absence of a "consensus doctorum" about the aesthetics of computer art.

Thomas E. Linehan

Adviser's Signature

To my wife, Mandy.

ACKNOWLEDGEMENTS

I would like to thank the participants for their generous support and effort. Their cooperation and contributions to this endeavor were, of course, crucial to the determination of any authoritive hypotheses attributed to this investigation.

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Frank Dietrich: Computer artist and author on the subjects of computer art and aesthetics; Palo Alto, California

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Mihai Nadin: Eminent Scholar in Art and Design Technology, The Ohio State University

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I would also like to thank my advisor, Thomas Linehan, as well as Terry Barrett for their support, encouragement and valuable counsel involved with the execution and reporting of this aesthetic investigation.

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Major Field: Computer Generated Art and Animation

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PREFACE

The delicate balance of aesthetic criteria, that between established theory and new theory, is, in itself, an indicator of the level of change which exists within the community of the arts. That change and its increased frequency of occurrence is demonstrative of an acceleration in the progression of artistic endeavor, as witnessed in late nineteenth and twentieth century movements. With the advent of "modern art," the processes for evaluating newer art forms through language have grown increasingly more complex. New perceptions and experimental philosophies of art often defy traditional aesthetic values and force critical analysis beyond "normal" limits in an effort to understand unfamiliar concepts.

As early as 1937, Electronics Magazine was printing examples of oscillographic design based on the principles of analytical geometry. These rudimentary images, spirographic in nature, proved to be the humble origins of the more sophisticated works that would follow. As predecessors of imagery that would later be generated by analog and digital computers, these elementary examples represent some of the earliest attempts to combine mathematics and electronic calculating machines in a creative venture.

Since that time, with increasing emphasis on the last twenty years, the field of computer art has been growing, changing and pushing its way into the already complicated domain of aesthetic pursuit. Now, on the brink of the earliest stages of its maturity, computer generated imagery is making its strongest claim yet to an autonomous heritage within the domain of artistic endeavor. The determination of computer art's station in the mainstream of aesthetic progression depends largely on our perceptions of it as a true art form.

To what degree computer art's advancement will affect our perceptions of its artistic achievement is a factor of more than passing consequence to its critical evaluation as an art form. The relative merit and subsequent worthiness of digital art must be based, in large part, on the aesthetic criteria employed for its justification.

Any evaluation of acceptable aesthetic principles is based upon individual judgment, as well as consensus. Historically, the final realization of a new art form has required the general consensus of scholarly analysis as well as the test of time, ultimate proof (albeit hindsighted) of its lasting value.

Considerable attention has been directed, on an individual basis, toward the questions of aesthetics which computer art has raised. This study proposes the need for more focused debate concerning these

issues, with an emphasis on the unique qualities, if any, of computer art. If computer art possesses the credentials essential for validation as a new art form, then intelligent inquiry must probe the possibility that a "consensus doctorum" exists about the issues.

Consensus does not preclude individual judgment from the decision-making process involved with aesthetic analysis but, rather, subordinates that judgment within a broader perspective of formal academic evaluation. Thus, a combined perspective can serve to enhance a more thorough understanding of the art form under consideration.

CHAPTER 1

Introduction

The realm of computer generated art, while expanding at an enormous rate, is still relatively young when viewed as an art form within the broader range of traditional artistic expression. Yet, chronologically, its span of development exceeds many previously defined, legitimate art movements within that same range. Its status within the art world is changing; its acceptance and ultimate station in the community is forthcoming. The ramifications of its acceptance will, I believe, affect the way we approach the creative experience, and its recognition as a progressive chapter in the book of artistic endeavor raise many questions concerning its unique qualities relative to aesthetic achievement.

Computer imagery encompasses a variety of applications, most of which fall outside the boundaries of formal artistic endeavor. My concern is with the computer picture created for the sake of artistic achievement. These endeavors suggest that there may be inherent properties of computer art which would require some changes in our approach to evaluating its aesthetic worth. By what criteria might a computer generated picture be appraised for its artistic merit?

If computer image synthesis, as art, possesses the hallmark qualities of a truly new, innovative art form, then our previous suppositions of aesthetic evaluation must change with an awareness of them. Thomas Linehan states:

"The burden of proof traditionally falls to an innovation to establish its own merit. This is as it should be. The alternative requires blind acceptance of the often outlandish claims of 'would be' innovations. If one accepts the notion of relative innovation, minor innovations require less effort to establish merit. ...The innovation is one of degree." [1]

The paradox of digital image synthesis, or computer art, is the inference that it possesses qualities of an aesthetic nature that are unique to this art form. As Linehan states:

"Advanced digital image synthesis, in the context of the visual arts, appears to present a challenge to existing aesthetic theories. Several areas of innovation in the imaging process present problems for which existing theory does not account. The identification of these areas of innovation is seen as only the first step toward an adequate theory construction. It is not assumed that a comprehensive theory is necessary, but that attention to theoretical issues could clarify critical issues of computer generated art and enhance current practice." [1]

A procedure for inquiry into the developing aesthetics of computer art is obliged to consider "expert opinion" pertinent to this subject matter. Hence, this investigation directs a formalized, heuristic approach to the issue by means of an interactive survey known as the Delphi Procedure, in order to explore the various ideologies present in scholarly debate relative to digital image aesthetics. Essentially a philosophical endeavor employing a survey method, this study investigates the possibility of realizing a "consensus doctorum" about the issue.

The Delphi Procedure

The Delphi procedure was developed during the early part of the 1940's by the RAND Corporation as an information gathering and decision making technique for use in areas where information and decisions were speculative in nature. RAND discovered that, in many face-to-face meeting situations, individuals with opposing views often spent time arguing personality differences and did not explore solutions to the problem at hand. Delphi eliminates committee activity by gaining a consensus through a series of postal questionnaires. Participation by the individuals is of an anonymous nature, in so much as none of the respondents are aware of the identities of their counterparts.

A panel of experts is carefully selected and then asked to address an issue in written form. The initial responses are likely to spread

over a wide range. A follow-up questionnaire is sent to the respondents with a summary of the distribution of the initial responses. Participants are then asked to consider previous answers or remarks, respond to this new information and revise opinion as they see fit. This procedure is continued until a consensus of opinion is reached, or until no further progress toward a consensus is evident. However, experience has shown that convergence usually occurs at the second iteration [2,3].

Of particular concern to this method are the choices of respondents who will be involved in the study. Participants need to have a learned as well as an intuitive overview of the subject matter under investigation in order to make authoritative judgements about the issue, or issues, at hand. Through a carefully considered selection process, a listing of eligible candidates of various backgrounds and professional vocations was developed. All were actively involved in the direction of computer technology toward artistic achievement. Their reputations in the visual arts and computer sciences as well as the academic fields encompassing those areas are widely recognized and highly respected. With the list of potential respondents, or target group, thus established, ideologies generated from the Delphi study could now serve as expert opinion toward authenticity of possible "consensus doctorum."

This report presents the thoughts, learned opinions and beliefs of eight individuals who are all highly qualified to examine these issues in intelligent, authoritative debate.

Crucial to any legitimate study of this nature is the development of the questionnaire, or questionnaires, deployed in the process. Of primary importance is the exclusion of bias from the language of the questions posed to participants. Added insurance against such a condition was the license granted to respondents for re-phrasing questions according to their own personal satisfaction.

The following two pages represent a verbatim copy of the questionnaire administered to respondents at the onset of this study. Its content includes a condensed statement of the issue(s) addressed, six questions about the issue(s), a summary question to support clarity of intent, and closing remarks expressing the freedoms available during the initial response process. Also included is a final note of consideration about the scheduling of the interactive polling process, as well as a mindful gesture that, as incentive toward active involvement, participants would receive a copy of the final report.

PHASE ONE QUESTIONNAIRE

Historically, the validation of a new art form has solicited the consensus of scholarly analysis as well as the test of time , the extended proof of its lasting value. Time, of course, takes care of itself and with its passage does a fairly thorough job of weeding out trends and fads. With the advent of "computer art" the matter of analysis, or more particularly, a system for evaluating it remains an unsolved issue.

The realm of computer imagery encompasses a variety of applications, most of which fall outside the purpose of art,[e.g., advertising, television, movies], serving commercial goals that supersede aesthetic goals. There is, however, an ever increasing body of work created solely for the purposes of formal artistic expression. These endeavors are executed using an array of high and low end devices, from paint-systems and computer-enhancement techniques to 3-D raster display computers, all of which incorporate a variety of generalized and specialized software libraries. It is primarily this art to which the following questions are addressed.

* Should computer art be considered a new art form which requires new criteria for assessing its aesthetic worth?

* If not, why not?

* If so, what is unique about computer art that renders traditional aesthetic norms obsolete?

* By what new or revised criteria should it be evaluated?

* Are there traditional aesthetic criteria which are adequate for judging computer art?

* How might the changing technology affect aesthetic considerations relative to computer imagery?

To summmarize the above points, how do the aesthetic qualities of computer art influence the aesthetic criteria by which that art is measured?

Figure 1.

Figure 1. (continued)

Should you feel that the questions on the preceding page are not structured toward your own perception of the issues which they address please feel free to rephrase them to your satisfaction. If so, I would be interested in hearing why you felt the questions needed re-wording.

Also, if you have recently written materials which reflect your current thinking relative to these issues, such materials are welcome and fully acceptable as a response to this first phase of this Delphi survey.

Please allow yourself enough time to consider the questions and your responses fully. It is my hope that you will respond within a two week time frame. For the Delphi process to work effectively all responses must be retrieved by a specified date so that analysis and re-iteration for the next phase can proceed on schedule. Your cooperation in this matter will be greatly appreciated and will contribute to the conciseness and efficiency of the final report, which you will be receiving upon completion of this project

Initially, it was intended that abstracts of the original remarks be presented as a condensed format in order to facilitate retrospection. However, variations of the divergent rationales that participants have exhibited are firmly embedded in these intuitive responses. It was determined that generalization would preclude the reader's involvement with the varying degrees of emphasis and nuance within the applied lexicon. Therefore, these proceedings accomodate each of the eight participants' commentaries in their own words, and following the individual responses are accompanying reviews to assist in a more complete perception of the intent and meaning of them. Evaluation of their cumulative attitudes is presented in the conclusion of these examinations.

This study also employs a comparitive graphic rating scale, in chart form, to assist in localizing focus of the overall attitudes toward more concise delineation of prevailing opinion. These charts were not, in any form, a part of the original survey questionnaires, as it was felt that responding through such a stringent platform as a rating scale would be both presumptuous and audacious for the ideologies of this inquiry. Their purpose is to serve as flowcharts, or mapping indicators, for the evaluation of the responses submitted.

CHAPTER TWO

Phase One of Survey

Charles Csuri:

"With any new, that is, identifiably new art form, new criteria are required and must also be identified or formed along with it. I remain unconvinced, however, that the present representations of images created by computer constitute examples representative of a uniquely new art form...yet. Actually, earlier works of art in this field exemplified much more potential as the beginnings of a new wave of artistic creativity than has actually occurred. Artists still tend to be confined by the technical aspects of computer generated images. The capacity for some personal integrity uniquely relative to this imagery has not yet been realized.

"It is always difficult to perceive the actuality of any truly pioneering aesthetic developments in the realm of art that, constituting a breakthrough, may be coined a 'movement.' This has been true even of abstract impressionism, pop art, cubism, etcetera, all of which ultimately required some sense of history or position within that

history before concrete evaluations of those movements could be justified. Getting back to computer art, I have yet to see any new reality or new point of view, or any tangible evidence that there is any coming together of individuals within what might be called a movement.

"Hopefully, as we handle the complexities better, and understand the relationships of the individual parts of an image or motion, then the potential for realizing computer generated pictures will be imminent and the justification for new criteria will be forthcoming."

Frank Dietrich:

"If there is an art form called computer art it is still very young, barely twenty years old. The accomplishments of such a new medium cannot be compared to the results of traditional art forms created by artists worldwide during centuries and even millenia. We must be patient and let this art form continue its growth to maturity in order to assess its strengths and limitations correctly. Jumping to conclusions before the medium has completely unfolded and while artists are still investigating the new terrain could lead to the establishment of categories and misconceptions confining the necessary freedom for creative experiments and visual research.

"The richness of computer imagery leaves no visible trace of the components inherent in the structure of the technology. Therefore, the emphasis of the critics will shift from a judgement on technical achievement to artistic virtue. Such an evaluation does not refer inparticular to 'computer' art, but to art in general. A piece of computer assisted art will be confronted with the same questions as any other work of art; how does it respond and contribute to contemporary society?; how does it reflect and challenge human needs and desires?

"Because the visual appearance is no longer indicative of the computer medium the subject of a proposed digital aesthetics cannot be the final result but rather the generative process which employs the specific capabilities of computer technology. This discipline focuses on the computer as a visual communication medium and investigates generative imaging concepts which originate from the processing architecture and image memories. Key elements are based on the functionality of binary logic within the creative decision making process as well as combinatorial procedures to generate a multitude of design propositions automatically.

"Similarly, new aesthetic issues are posed with the existence of millions of colors which may be harmonically grouped to create desired color contrasts. Also, time has become randomly accessible, too. With film, time is embedded in the physical succession of frames into one continuous strip. Digital time, however, follows a fast,

software-controlled switching pattern between frames without physical proximity being necessary.

"All of these components form such formidable quantities that automatic assistance becomes essential if complex relationships between them are to be created efficiently. Generative aesthetics sets out to establish these classes of rules (aesthetic algorithms) which can be applied to the process of creating digital images.

"The interactive capacities of a computer system introduce significant changes to both the process of creation and the role of the artist and audience. Ongoing storage and retrieval of visual data encourages new dimensions of trial and error. No longer are the spectators simply confronted with a static piece of art but now they can be challenged to interact with the machines and/or other viewers inside the environment.

"The real advances of this art form are still ahead of us, when modes of human intellectual endeavor such as emotion, association and intuition, which are main ingredients of art can be successfully simulated by computers. The act of creation itself will become automated by learning machines which will self-modify their programs, thus interacting intelligently and autonomously with the world. Art-making machines will instill new meaning to the process of bridging mind and matter."

Hiroshi Kawano:

"I do not see computer art as an art form that would ever require new criteria for assessing its worth. Instead, computer art should be considered the art whose producing subject is the computer itself, not the human artist. Therefore, the computer art system should be able to generate its generative rules of imagery by learning.

"Accordingly, there are traditional aesthetic criteria which are adequate for judging computer art because computer art is the simulation of human art, so the criteria for human art should apply to computer art, too. It should include not only classic art but also baroque and primitive arts.

"Computer art is the art of computer as artificial intelligence. A computer can solve an algorithmic problem by digital computing. Therefore, as long as art has an algorithmic procedure, a computer should be able to have its own artistic behavior.

"A computer can produce its own works of art by representing the logic of artistic procedure which is hidden in human art. So this representing process is called the simulation of human art by computer. Thus a computer artist should be a programmer who can teach his computer to produce works of art by itself and, furthermore, know about the digital computing behavior of his computer in detail.

"An 'art computer' cannot simulate a human art until the algorithm of art is found and described as a program. But this algorithm of art can only be made clear by scientific aesthetics. In this meaning, the work of 'art computer' is an experimental product of scientific aesthetics. Only the new, scientific aesthetics which has replaced the old, traditional aesthetics can provide an effective method of programming for 'art computer' because the algorithm, that is the digital computing logic of art, can be cleared up only by scientific aesthetics.

"How can such an algorithmically produced work possess its aesthetic quality? This answer must be obtained from 'art computer' itself! We cannot feel even another man's human feeling, much less computer's feeling. The works of 'art computer' would show us an aesthetic quality as beautiful, sentimental, comic, etcetera, only for the appreciator with an empathy to it. However, this philosophical problem now doesn't seem so instructive for our 'art computer.'"

Monique Nahas:

"I don't feel comfortable with the establishment of criteria. It would be easier for me to discuss, for instance, the evolution of my personal criteria during the last fifteen years.

"As to computer art as a new art form with new criteria, my response is yes and no. It is certainly new in its medium and in its relation with the development of software and hardware. The main technics are not fixed; even 'paintboxes' are improving all the time. But more than that, algorithms are closely associated with significant improvements of the pictures. A picture can be stored and modified all the time, never finished if we want. But when the artist decides to stop and produce a picture that can be hung on the wall, to my feeling the criteria are the same as for any other painting.

"The problem is that these criteria, even fixed by time, are not independent of a recognition of 'good technics', even if it is variable, following each person or period.

"On the other hand, a unique facet of computer art is in animation, which could be a new artistic expression. There exist few traditional values from that point of view, maybe just the 'cinetique' approach.

"I personally am very sensitive to the technical improvements in pictures, and my criteria are, in a sense, influenced by the developments of the works of computer scientists. In any case, the historical invasion of computers everywhere is a factor of under or overestimating computer art. It is probably impossible, for the present time, to escape that fact."

Mihai Nadin:

"I do not like to use the expression 'computer art' but rather, art created by computer. As to this kind of art, I believe some of it seems to require a new criteria for assessing its aesthetic worth and some does not, as the latter appears to have been created using quite traditional values in an attempt to emulate what has gone before.

"As to whether this art renders traditional aesthetic norms obsolete, it appears that some have already been rendered thus, while others have been strengthened. Interactive artistic expressions within this field certainly promote exploration into newer criteria by which we can understand their meaning and intent. On the other hand, many of the most fundamental aspects of present criteria, such as harmony, symmetry, rhythm, and color, seem to be re-emphasized through computer generated art. Many traditional criteria have become obsolete in years gone by as new ideas about art have taken shape. This will be true of computer generated art as well. For the time being, it appears that the medium is still controlling the artist.

"One point presently a problem is the computer output of this imagery. That is, the 'window' or screen image that confronts us, is still a confinement. When breakthroughs in this area occur, including more sophisticated interaction, holography and whatever else might come along, then our present methods of evaluation, our criteria applied to this art, will adjust to it.

"I might mention that the quality of the computer as a disseminating tool in the communication of imagery may be the single most important reason for us to change our criteria. Through this medium we will be looking at art, both old and new, from an entirely unique vantage point. This, I feel, will ultimately effect our value system toward all imagery in profound proportions."

Frieder Nake:

"Should computer art be considered a new art form requiring new criteria for assessing its aethetic worth? No, with some qualifications. A work of art should always be judged from the message it tries to communicate in relation to the means it employs for achieving this. Viewed as a product, the work of art loses its connection to the process by which it was produced. It either gains interest, arouses reactions just by being there, or it is no more than passing aesthetic worth.

"Now, the very term 'computer art' suggests that is the computer that adds aesthetic reality to a given piece. A rather horrible suggestion! Traditional aesthetic objects bear hints like 'oil on canvas' and the like. Such classifications help in judging the image (has the artist used his means intelligently for this goal?). But they are not constituting features.

"However, if computer art were considered as a new art form constituting new aesthetic criteria, then there may be unique features about that art which would render traditional aesthetic norms obsolete. The difference is that of process and product. Aspects of the application of computers to produce aesthetic objects include:

"* The artist manipulates information more than matter

"* He thinks in classes or sets of objects

"* His intuition is geared more toward the abstract rather than the concrete

"* He develops a feeling for the dynamic existence of the work on its way to static existence

"* He experiments interactively with a hardware/software system"

"All these aspects may eventually lead to the discovery of genuine computer art, but it has not happened yet. When it happens it is likely that some of the following observations may give rise to the necessity of new criteria:

"* The process character of much computer art

"* The disappearance of the unique piece, its replacement by any number of similar objects

"* The realistic dynamic rendition of unreal scenes

"* The possibility of mixing sensory channels via data processing"

"The criteria for judging art are basically:

"* What is the message the artist wants to express by his work? Is it of relevence to me, the audience?

"* Are the means used in this work adequate to express the message?"

"Thus, as long as computer art has not become an art, it is not necessary to develop any new criteria. We will discover that it has reached the state of an art form when it will be unnecessary to refer to the computer when talking about it. For the time being, the medium is surpressing the message almost totally. When that higher state will be achieved, we will develop some new criteria. Until then, everything is pioneering work. Some will turn out to be farsighted, Some will appear ridiculous someday."

Lillian Schwartz:

"Computer art, or rather, imagery created with the use of computer should not be considered a new art form nor should new criteria be required by which to evaluate it. The same considerations we presently use to judge art should be engaged no matter what the medium.

"In any case, establishing a set pattern of aesthetic rules that may be applied to various artistic endeavors is a very difficult task. Aesthetic considerations are in a constant state of flux.

"The painter Fantin La Tour's work was stored in the basement of the Metropolitan Museum of Art for years, until recently, when his work was 're-evaluated' and is now displayed in the museum's galleries.

"In time, art historians, critics and the like will critique this field, their views will be attacked, then changed, as always."

Gene Youngblood:

"While we seem convinced that, ultimately, the computer will reveal the way to unlimited new aesthetic horizons, the idea of an art unique to the computer remains unrealized. And, it might be said that art, any art, is always independent of the medium through which it is practiced. The properties of any medium, the techniques that define it,

do not constitute the explorations which they may facilitate. The boundaries of computer art, as we know them today, are circumscribed by a much larger history, that of the fine arts tradition, which contains all visual art and defines its possibilities. The myth of computer art is that it is a visual art.

"This is not to imply that computers do not give us new visual experiences. Three dimensional animation, for example, is not only unprecedented in a visual sense but may well qualify as a truly unique art form. Digital scene simulation is by far the most awesome and profound development in the history of symbolic discourse, its aesthetic and philosophical implications are staggering. But, the question whether a particular work of three dimensional animation is art will be addressed in a historical context that need not, and should not, take into account the medium through which it was produced.

"The true aesthetic significance of the computer will be revealed to us only when we begin to explore that which is unique to it regardless to whether its results are artlike or not, for what is most unique about the computer is precisely its intelligence, its interactivity. This is repeatedly confirmed by computer artists themselves, whose testimonies are almost always about the processes of producing the art through interaction with the intelligent machine rather than about the art itself.

"As to this interactivity, the concepts 'artist' and 'audience' become the roles of 'author' and 'participant.' A truly interactive environment becomes conversational; its laws change as a result of its interactions. This is the ultimate case of Marcel Duchamp's dictum that the artist begins the artwork and the witness completes it. For the more interactive a system is, the more transparent it becomes."

Review of Charles Csuri's Phase One Response

Professor Csuri presents the argument that as long as there is no tangible evidence, by way of visual exemplars, for supporting a premise of computer art as an "identifiable new art form," then a present need for new aesthetic criteria by which to evaluate it also does not yet exist. Witnessed proof, by his estimation, will unveil itself when artists achieve a mastery of the processes involved to the point of discovering a "new point of view," evidenced in their work.

Csuri alludes to the history of past innovations and the difficulties encountered in their realization. Still, he maintains the opinion that, until further development and historical perspective suggest otherwise, the products of computer imaging must comply with existing aesthetic criteria.

This perspective implies a conditional status to the possibility of new criteria. It suggests a potential need for their development but disavows any pre-existing qualifications which might induce their development. Until such a maturation process involving the artist and his relationship to the processes of the medium culminates to some definitive conclusion, conditions indicative of a new reality remain only latent possibilities.

If this is so, that potential characteristics remain dormantly embodied (pending some awakening by the artist) within the framework of this art form, then Csuri does not deny that a new art form may be evolving or that existing aesthetic criteria might be inadequate for its assessment. As of yet, however, he would prefer to refrain from conjecture and in regard to re-evaluating traditional guidelines of aesthetic theory.

Review of Frank Dietrich's Phase One Response

As an artist involved in the activities surrounding digital image processing, Frank Dietrich's awareness of the larger history of aesthetic progression precludes a closed perception of computer art as a separate entity, standing apart in presumed uniqueness from the greater body of artistic achievement. He would debate that the assistance of computer technology offers innovative principles to the production of such art and that, in such innovation, there is concern about its effect on the aesthetic results of its application. But, as to the resulting imagery, Dietrich expresses caution against assumptions that such procedural peculiarities infer revisions of aesthetic criteria for its assessment. Moreover, Dietrich contends that such art is subject to many of the same fundamental considerations regarding any creation which supposes aesthetic value.

However, his statements go on to assert that those intrinsic prescripts of the technical procedures, such as regenerative imaging, interactivity and randomly accessible timing predicate a philosophy of an "aesthetic algorithm." Furthermore, development of these processes toward intellectual procedures of an intelligent, intuitive machine will engender to computers the abilility to self-create and revise previously non-existent aesthetic principles. Then, the need for aesthetic criteria to the assessment of computer art will be self-fulfilling.

Review of Hiroshi Kawano's Phase One Response

Hiroshi Kawano's response reflects Frank Dietrich's concluding remarks, expressing the realization of an "art computer" which is well versed in the humanistic levels administered to creative activity. Kawano first states the irrelevence of new criteria for aesthetic evaluation, then reasons that the technology itself, once "educated" by the artist/programmer in the concepts of "scientific aesthetics," will take on the responsibilities of applying such criteria as an active function of its ongoing creative processes.

Though Kawano intimates that "art computer" is mimicking the logic of human art (logic presumably distilled into symbolic information as data), he extrapolates a much loftier perception, inferring that, ultimately, the "scientific aesthetics" of "art computer" will replace the applications of traditional aesthetics.

The ramifications of such a development, subscribed to by Kawano, would be unprecedented within the larger scope of aesthetic endeavor. Its implications rate serious attention as computer technology progresses to a point of possibly considering hybrid aesthetics, scientifically formulated and technologically invoked. Such conditions raise questions concerning the identity of the artist as a role player within the gestalt configuration of "art computer."

Review of Monique Nahas' Phase One Response

Monique Nahas asserts that criteria for aesthetic judgement is a subjective proposition, and surmises that the search for answers to such disputes will be problematic, at best.

Referring to the "technics" of computer art, Nahas points out that they offer unique possibilities to the creative processes. Generative modifications of evolving works and algorithmic procedures applied to picture definition are determinants of the unique facets of computer art, as are the capabilities for animated aesthetic works (though existing film theory might cover the latter consideration). Nahas expresses a broader concern that the rapid growth of this field of visual expression is bound to continue to have an impact on these issues.

Review of Mihai Nadin's Phase One Response

Mihai Nadin tends toward a discretionary recognition of individual innovations evident in the body of work which has accumulated within this field of endeavor. His point of view argues against the term "computer art," suggesting such labeling as unqualified presumption that all visual expression performed via computer technology possesses inherently unique properties. While he would concede that there are specific instances which justify a case for revising existing criteria, there are also obvious examples of this genre that rely largely on the support of traditional aesthetic values. Dr. Nadin predicts that as artists more thoroughly control the "medium" and as new ideas within this field unfold, then the more obsolete existing criteria will become. This represents a philosophy of "progressive revision," along a continuum of time and events.

One obstacle in the path of developing innovations, according to Nadin, is the constraint of the "window" image as a presentational format. Future developments in the technologies of output configurations will demand further amendments to applied criteria.

But, most significant to these issues is an ability that is inherently characteristic of the medium, its use as a disseminating tool in the communication of imagery. This ability to network all forms of art to the general public, and the digital manipulation of such

art by all involved is a unique characteristic apart from traditional artistic approaches. Dr. Nadin perceives that this unique feature is the strongest justification for reconsidering existing aesthetic criteria.

Review of Frieder Nake's Phase One Response

Similar to some previous respondents, Frieder Nake views the questions in a historical context and supports, to a degree, traditional precepts about these matters. The proverbial labels of aesthetic description, asserts Nake, do not necessarily distinguish traditional art works to some elevated status. So it follows that terms like "computer art" should not be construed as justification for special consideration. For this purpose, more intelligent inquiry must be put to task.

Nake does consider the unique aspects of composition and suggests that the processes involved may be more innovative than the resultant art. This viewpoint reflects, in part, that of Frank Dietrich, who attributes much of this art form's innovative qualities to the procedures involved.

According to Professor Nake, these unique procedural features provide the artist with a new perspective about his creative approach. He cites specific examples of the transformed relationships between

artist and artwork as consequences of these procedural peculiarities.

Such concerns, Nake observes, are still pending and do not consign prevailing theory to a status of obsolescence. In line with Csuri's thinking, the time has not yet come for applying new criteria to the aesthetics of computer art. Until that condition permits us to do so (when the techniques of the medium are subordinate to the results), endeavors in the field remain the harbingers of this realization.

Review of Lillian Schwartz' Phase One Response

Lillian Schwartz is unequivocal in her response and dissents from the premise that computer imagery is either a new art form or that it invokes a need for new aesthetic criteria. Art should be perceived universally and its evaluation should engage universally applied criteria to that task.

However, caution (against over-emphasizing any assemblage of rules governing the evaluation of art) is also an underlying theme maintained by Schwartz.

She observes that fluctuating values in traditional aesthetic debate often thwart definitive analysis of any lasting meaning.This will also be a problem encountered when broaching the issues about the aesthetics of computer art. An awareness of the inconstant social and cultural ideologies applied to aesthetic models, Schwartz infers, should fuel a healthy skepticism toward structured philosophies for computer art.

Review of Gene Youngblood's Phase One Response

The viewpoints of Gene Youngblood reflect, initially, earlier statements that aesthetic ideologies specifically for computer art are not yet necessary. A fundamental consideration of his perspective is the proposition that any artistic creation should stand apart from the techniques by which it was accomplished. Furthermore, states Youngblood, existing computer art is sponsored by a heritage of traditional aesthetic principles.

Beyond these concerns, it would seem that certain areas (such as three dimensional scene simulations and animations) are pressing the boundaries of existing criteria to a point where computer art might be considered as a truly new art form.

Perhaps most noteworthy of Youngblood's remarks is the notion that the degree of interactivity attributed to the creative processes of computer imaging is a unique manifestation of this medium. These transpositional relationships between artist, art, and the perceiver of that art can transcend conventional aesthetic measurement. Further exploration and expansion of inherent interactive stimuli, Youngblood believes, may yield a final awareness of its import as an innovative art form.

CHAPTER THREE

Phase One Results and Conclusions

In this first stage of the investigation, sentiment varies about certain aspects of the questioning, while other areas seem to indicate an alignment of opinion. Clearly, not all the respondents addressed the questions in an orderly sequence, though a top to bottom approach is fairly evident in most responses. Since the first questionnaire represented the initial bridging of the issues it was anticipated that a certain degree of indirect responses would occur.

While there may not yet appear to be any unequivocal consensus of sentiment, there are certain concerns that are generally supported. They are:

* Caution against hasty establishment of new aesthetic criteria;

* A re-affirmation of traditional aesthetic values;

* Wariness of set aesthetic guidelines, traditional or otherwise;

* A reliance on an historical perspective about these issues;

* Caution against confusing a technique with an art form;

* A concern with technology subordinating the creativity;

* A conditional status to realizing computer art as a potentially new art form; and

* Exception to the use of the term "computer art."

It is obvious, at this point, that none of the respondents is prepared to proclaim that computer art is a new art form or that it necessarily requires new criteria for its assessment.

If there is a reticence on the part of participants to make such claims it is, perhaps, justified by past experiences within the chronological progression of events relative to the visual arts. The art community has adopted an apprehensive attitude toward proclaimed innovations due to past false claims of apparently unique movements that simply did not live up to the expectations of their sponsors.

A dependence upon time to gain a perspective of the developments and changes within the visual arts is, therefore, an understandable posture. However, an exclusive trust in an historical view relegates the ideologies and sensibilities of the present climate to an obscure

vantage point of future consideration. There can be an advantage gained from a combined perspective, one which benefits from both present and future deliberations on these issues as they relate to the progressive endeavors of computer generated imagery.

Beyond these considerations, there is another current of thought which, along with concerns of an historical perspective, underscores a prevalent theme within the respondents' remarks. It is an area of discourse which focuses on the separation of production and product. The unusual practices that computer technology brings to the processes of creativity, in the performance of computer art, are procedural methodologies which, while unique in themselves, do not necessarily reflect an innovative art form as the consequence of those applied methods.

The questions surrounding the relationships between the processes of traditional artistic pursuit and the art object have been debated in length. Most in the field would agree with the separation of the two in the final analysis of either. This, perhaps, becomes a more arguable point when examining the potentially innovative qualities of computer art pondered by respondents.

When asked to comment on the possible unique features of this art form, there was a noticeable increase in the willingness of respondents to acknowledge such properties, so long as recognition of them was not

conditional to the acceptance of computer art as an innovative art form requiring new aesthetic criteria ("If one accepts the notion of relative innovation, minor innovations require less effort to establish merit...") [1].

There are three attributes of a unique class which have surfaced from the various remarks elicited. Participants, in delineating these qualities, distinguish them only as potential indicators for realizing an innovation, not as currently qualifying factors. While these qualities are of a generative nature, their effects may be evident in the works derived from them.

They are:

* The various facets of interactivity, ranging from aesthetic conception to aesthetic perception;

* Artificial intelligence, applied to the creative processes of aesthetic endeavor; and

* The widespread dissemination of art, promoting individual manipulation and discrimination of visual proposals.

These attributes of inherent uniqueness, while not majorally subscribed to by respondents, represent separately identifiable concepts, distilled from the combined remarks, that must be addressed by all participants.

In appraisal of traditional aesthetics and their significance to computer generated art, participants agree that these values play an active role in the evaluation of this imagery. Particular responses are more stringent than others in recommending adherence to established criteria, but majority support of traditional measures is obvious, if for varying rationale.

There appears to be an emphasis on three areas of generalization which advocate traditional aesthetics:

* A re-affirmation of plastic ideologies, resulting from examples which, in ignoring such fundamentals, forfeited their aesthetic importance;

* Recognition of a fine arts heritage, in which the roots of computer art are firmly embedded; and

* An absence of new aesthetic ideologies in computer art, which would substantiate a departure from traditional aesthetic considerations.

While there is considerable concurrence of opinion endorsing traditional criteria, individual remarks supporting their adherence vary to such an extent that their inferences require additional deliberation by all respondents.

To help determine the relationship of attitudes reviewed, the names of the respondents appear on a graphic chart (on the following page) with headings paraphrasing the first, third and fifth questions from the phase one questionnaire. Embodied within these three questions, to which all of the participants have addressed, lies the essence of this investigation's focus.

Placement of names on the chart is intended to illustrate the correlation of prevailing opinions. Through this visual representation a truncated overview of stances assumed to the issues thusfar becomes apparent. Categories of "degree" regarding expressed reactions to the questions are quite general and are intended to distinguish major areas of attitude response. Any alignment of opinions or sentiments should begin to materialize at this point.

PHASE ONE RESPONSE CHART

* Is computer art a new art form requiring new aesthetic criteria?

NO	NO/MAYBE	MAYBE/YES	YES
Kawano	Csuri	Dietrich	
Schwartz	Youngblood	Nadin	
	Nahas		
	Nake		

* Is there a uniqueness to computer art which would render traditional aesthetic norms obsolete?

NO	NO/MAYBE	MAYBE/YES	YES
Kawano	Csuri		Dietrich
Schwartz	Nahas		Nadin
			Nake
			Youngblood

* Are traditional aesthetic criteria adequate for the evaluation of computer art?

NO	NO/MAYBE	MAYBE/YES	YES
		Csuri	Kawano
		Dietrich	Nahas
		Nadin	Schwartz
		Nake	
		Youngblood	

Figure 2.

The phase one graphic chart will illustrate a congealing process, if evident, of the various ideologies presented. It is apparent, by this overview, that a quorum may already have been reached relative to maintaining traditional aesthetic criteria. This is not surprising, in light of the proven significance of existing values to the progression of the visual arts.

Evident, from the reactions to the question of computer art as a new art form, is a dispersion of opinion with a tendency toward disagreement or unresolved determination. Hiroshi Kawano proved an interesting case for identifying his position on this question. While he eschews the concept of digital art as a new art form requiring revised criteria, he subsequently refers to the replacement of traditional aesthetics with "scientific aesthetics," or an "algorithm of art." However, his claims (that such an algorithm is the synthesis of traditional measures, rather than an alteration of them) align his sentiments with those of Lillian Schwartz.

As for the question of unique qualities inherent to computer art, there is a persuasion suggesting the probability of such attributes. There are also two dissenting points of view and one inconclusive opinion.

As the investigation advances toward the next stage, there are now more tangible points of debate available for consideration by the participants. With more thoroughly defined goals comes the need for more specific structuring of the questionnaire engaged in the research. To this end, key points, speculations and significant observations elicited from phase one remarks have been summarized for consideration in the next phase of the research. These remarks, of which there are six, have been organized and applied to the two principal questions which have materialized as prominent focuses of attention to the investigation.

On the following pages are copies of the phase two questionnaire, illustrating the arrangement in which these opinions were presented to the respondents during the second mailing. Basically, given two specific questions, there are three accompanying responses representing various, distilled opinions from phase one's discourse. The participants are asked to review the remarks as they apply to each question and respond accordingly. As evident in chapter five, phase two's responses are often more succinct than before, particularly when aggreement with remarks is achieved.

PHASE TWO QUESTIONNAIRE

QUESTION ONE:

WHAT IS UNIQUE ABOUT COMPUTER ART THAT RENDERS TRADITIONAL AESTHETICS OBSOLETE?

1.) The interactivity between artist and computer, as well as between viewer and art is a significant development within our present views of artistic endeavor.

The technology's generative image processes based on binary architecture in conjunction with the artist's mastering of and manipulating such procedures yields previously unattainable design propositions. Consequently, such possibilities have a convergent affect on the artist's decision making processes, in turn, affecting the resultant works of art.

YOUR RESPONSE TO THE ABOVE REMARKS:

2.) The ability of the computer to function as an instrument for the dissemination of visual imagery will profoundly change the way we think about art.

With large-scale networking, and the communication and manipulation of art, both old and new, our perception of all imagery will be dramatically modified. From this unique vantage point will come the prerogative of discretionary visual explorations, influencing and ultimately changing our present aesthetic criteria.

YOUR RESPONSE TO THE ABOVE REMARKS:

3.) The uniqueness of computer art is, or will be, the art of the computer as an artificial intelligence. As modes of human intellectual endeavor are represented by algorithmic procedures and computer "intellect" interacts, autonomously and self-modifying, with its environment, then new scientific aesthetics will replace traditional aesthetics.

The process of creation itself is then the responsibility of the learned computer which generates works of art possessing aesthetic qualities uniquely its own, instilling new meaning to the inventions of mind and matter.

YOUR RESPONSE TO THE ABOVE REMARKS:

Figure 3.

Figure 3. (continued)

QUESTION TWO:

ARE THERE TRADITIONAL AESTHETIC CRITERIA WHICH ARE ADEQUATE FOR EVALUATING THE QUALITY OF COMPUTER ART?

1.) Many of the most fundamental aspects of traditional criteria, such as harmony, rhythm, symmetry and color are re-inforced by computer generated imagery. That is to say, such artistic attempts which have emphasized the 'techniques' of computer art at the expense of more basic aesthetic sensibilities have had little to no import within the scope of artistic expression.

YOUR RESPONSE TO THE ABOVE REMARKS:

2.) The boundaries of computer art exist within a much broader history, that of the fine arts tradition. The same considerations presently used to evaluate art should be engaged regardless of the medium:

How does it respond and contribute to contemporary society?
How does it reflect and challenge human needs and desires?
Has the artist used his means intelligently for these goals?

Viewed as a product, the work of art stands alone, unconnected to the process by which it was created. Either it emotes some sense of aesthetic experience or it is of little more than passing interest

YOUR RESPONSE TO THE ABOVE REMARKS:

3.) It is always difficult to perceive any identifiable new art form for which new criteria might be required. As to the realm of computer generated imagery, however, there remains to be seen any significant pioneering breakthroughs which would suggest a new or revised aesthetic value system.

Therefore, so long as the medium continues to control the artist, present aesthetic criteria are quite sufficient.

YOUR RESPONSE TO THE ABOVE REMARKS:

CHAPTER FOUR

Phase Two of Survey

Chuck Csuri:

Question 1 - Response to Remark #1:

"Interactivity has promise offering new relationships between viewers and art objects. However, the unique randomness of interactivity is not so different from viewing a sculpture. Real-time parameter changes acting from and governing the viewer of an interactive art object may be worthy of possible new criteria but care must be taken that the novelty of such technology does not overshadow the aesthetic function of that object. The technology has been oversold...the concept is still the precursor to art."

Question 1 - Response to Remark #2:

"Dissemination will make us more jaded. Though art may be re-combined differently, the same issue remains...the concept. Will this profoundly change the way we think about art? Maybe, but not if

art becomes only a device within the computer, which would cause an acceleration of jadedness."

Question 1 - Response to Remark #3:

"I disagree. This is a pretentious cerebral exercise in naivety. After twenty-five years of artificial intelligence not much has been accomplished, certainly not to the expectations of those in the field. If you read Marvin Minsky, you'll find that he thinks this form of whimsey is just that."

Question 2 - Response to Remark #1:

"Look at the classics, from Da Vinci through Ruebens to the twentieth century and pop culture. There is an inherent structure or clarity throughout. But through what criteria is that structure identified? Those inherent qualities are there to feel and acknowledge but cannot quite be defined or understood."

Question 2 - Response to Remark #2:

"I agree, but art is not totally unconnected from the process by which it was created. It is a matter of degree. The motivation of the artist must be of some concern. Art can stand alone but the degree of appreciation goes up with the knowledge."

Question 2 - Response to Remark #3:

"Yes, I agree. Even if the artist controls the medium, there is still nothing new happening here."

Frank Dietrich:

Question 1 - Response to Remark #1:

"Many different issues are lumped together here; interactivity, binary logic, machine architecture (data processors and image memories). Each of them does require particular attention and evaluation to its role in the imaging process.

"It can be assumed that the uniqueness of these components bears significance at any level of artistic communication with digital machines; the creative process, the visual material, and the act of understanding.

"This is fairly unknown territory to be further investigated by scientific/artistic visual research where theory and praxis compliment each other."

Question 1 - Response to Remark #2:

"Networking becomes important not only for the raw quantity of information distributed but as a qualitative jump, as existing communication technologies are brought together; phone, broadcasting, cable, satellite, video, computer. Each node of the network will be fully functional for production, dissemination and consumption at any given space/time coordinate."

Question 1 - Response to Remark #3:

"The new aesthetic will not necessarily be 'scientific,' according to rational logic. that is to say, the goal is not to design a machine with artificial intelligence but one with artificial creativity, which has to simulate what we call emotion, intuition and association. It seems to me that ,if there is a logic involved, it might be rather 'fuzzy logic.'"

Question 2 - Response to Remark #1:

"Since the computer can successfully simulate any given traditional medium, it is obvious that traditional aesthetics remain applicable. For instance, 'traditional' computer animation simulates hand-drawn or puppet animation by producing successively, but seperately, a sequence of still frames. Such use of the computer implies acherence to established cinematographic aesthetics.

"If the computer is utilized to generate constantly changing images based on the dynamics of the data flow through the processors and discreetly altered pixels in real-time, completely new models of image-change-in-time are presented.

"More often the computer is used to simulate traditional media rather than being explored on its own account. It follows that there is not much vision yet of what a digital aesthetics will look like."

Question 2 - Response to Remark #2:

"The last question, as relevant as it is, does not belong here. The heavy-duty questions of art's purpose in life completely ignore any regard to the matter, means, medium used. They focus on what it is that transcends the stuff out of which art is made. And only the transcending portion of the artwork, its 'meaning,' is what really counts."

Question 2 - Response to Remark #3:

"Even if the 'medium controls the artist,' aesthetics as a discipline should be able to contribute to future development by transcending the state-of-the-art. I am not advocating a 'sci-fi' methodology but one that is extrapolating from embryonic, often still hidden and unexplored stages of the issue to construct the foundations of something still to be built.

"To put it differently; an aesthetic which can only come into play once the dust has settled is worthless. Such aesthetics are blind toward recognition and evaluation of the pioneering efforts, as demonstrated in the statement, 'the medium controls the artist.'"

Hiroshi Kawano:

Question 1 - Response to Remark #1:

"I don't expect so much in the interactivity itself. Interactivity is more dominant in human art than in computer art."

Question 1 - Response to Remark #2:

"I don't think so. Art algorithm is more important. But, digitally representable images can expand the possibility of human imaging and can make it more flexible."

Question 1 - Response to Remark #3:

"I don't believe that new scientific aesthetics will replace the traditional aesthetics. But, new aesthetics can refine traditional aesthetics and can solve the problems which traditional aesthetics could not do."

Question 2 - Response to Remark #1:

"Yes, I think so. New computational aesthetics don't add anything to traditional aesthetics. That can only make clear the problems which this could not do."

Question 2 - Response to Remark #2:

"I believe so. However, computer art works imply the explicit algorithm about its creative process."

Question 2 - Response to Remark #3:

"Yes. Traditional, old aesthetics which are now about to die, can be revived only by the new medium and model. But human sense is bound to his personal body scale. Therefore, old aesthetics cannot treat the sense beyond this scale, which the new aesthetics can treat. However, this means the extension of human sense, and does not mean other than human sense."

Monique Nahas:

Question 1 - Response to Remark #1:

"Interactive or not, a work of art is a visual expression of some strong feelings at a given time. To play with an interactive paintbox

can produce a piece of art or not, but the audience is something different and can be delayed very late. To my point of view, the creation of the new, sophisticated paintbox can be compared to a modern Stradivarius. It does not preclude the existence of a composer, Mozart, or an interpreter, Isaac Stern.

"Artists create their own techniques, develop their own software or even their own hardware, if they can. A good instrument will probably be designed by both artists and engineers together, but in itself it is not the piece of art."

Question 1 - Response to remark #2:

"It is possible. But the example of the television is here. If the manipulation of pictures becomes a 'large scale' game, in the actual way of being, the criteria will probably shut down rapidly. It is a problem of democracy; how to preserve and promote individualities and original expressions? Although I believe in sharing a common aesthetical feeling with most of the people of the same occidental culture (for example, in front of a landscape), so there must be some answer in between.

"Another remark...the material realization of artwork is still important. Maybe with computers we will create real paintings, silkscreens, soon. It is so different when you see a masterpiece in a

museum or on a chocolate box! So the large diffusion of video images has its limits."

Question 1 - Response to Remark #3:

"I am sure that artists will use artificial intelligence in order to elaborate their own tools. And then, with a precise set of aesthetic requirements, the program can realize some series of rules. An example is the computed 'Mondrian' (I continue to prefer the original ones). But even if you were able to construct a real 'expert system' for your own pictures, the problem would be the possibility of changing this system. If you produce, all your life, the same thing, then there is no more creation for me.

"We are not able to extrapolate our own personal requirements. I was working with abstract minimalism in 1972 and now on more realistic pictures (more or less, 'baroques'). I don't know why. I do know that I am not looking at a picture in the same way. Being not able to read into the future, I don't know about the possibilities of the 'learned computer.' For the moment, the role of artificial intelligence is to learn that one has to open the door before going outside.

"Artists use all the possible tools; artificial intelligence is one among thousands of others. The activity of creation has always to be done."

Question 2 - Response to Remark #1:

"I don't understand these remarks...to my point of view, some works of great artistic value have been created by people coming from the 'technics' (which does not mean that I like the work of all engineers). For example, the movie 'Vol Libre' of Loren Carpenter is a piece of art, although the beautiful plants by Bill Reeves...

"Computer art is a kind of boundary. It can be good or bad from each side, engineers or artists. None of the great artists have never respected the rules of harmony or symmetry. Look at Rembrant, Monet, Bonnard, Goya, Velasquez, etcetera."

Question 2 - Response to Remark #2:

"To someone who is accustomed to looking at paintings, a work of art is never completely unconnected with the 'technics' of its time. The varnish of VanEyck, plaster of Rouault, painting with a palette knife, or Rembrant...it is certainly different to look at a painting with a technical approach. Anyway, I agree on the last remark."

Question 2 - Response to Remark #3:

"Okay. For the first sentence. The question of the present aesthetic criteria is the following: Do they authorize a new creation? I believe in the intuition of artists. It is very difficult to imagine

what will occur in art, but most of the artists have a non-analyzable, intuitive way of creating. Art is never compatible with a strong dogmatism. If the criteria are open enough, then they are quite sufficient."

Mihai Nadin:

Question 1 - Response to Remark #1:

"In reference to the interactivity between artist and computer I see no difference than, say, between the painter and his canvas. I disagree on this point.

"However, the newer activity between artist and audience, I must agree, is a unique feature of computer art, particularly with a special emphasis on the conceptual."

Question 1 - Response to Remark #2:

"I agree."

Question 1 - Response to Remark #3:

"I disagree strongly! Nothing of the computer would render traditional aesthetics obsolete. That should not even be the issue. Structurally, aesthetics are integrative, always based on past

performances or criteria. Traditional aesthetics cannot be abandoned.

"In any case, I feel that artificial intelligence is not computer intelligence at all, but rather, computer understanding. A.I. should be qualified for what it really is, at least at present...symbolic computation."

Question 2 - Response to Remark #1:

"I agree. I might add that people (artists) involved with computer graphics today have gone back to the basics to prove this point."

Question 2 - Response to Remark #2:

"I agree!"

Question 2 - Response to Remark #3:

"Agree."

Frieder Nake:

Question 1 - Response to Remark #1:

"Taken as they stand, the remarks all seem valid. However, it is not sufficient to leave them as they are because of their implications.

"The interactivity is, as stated, a 'significant development.' Its significance is the change of the way the artist interacts with his/her medium. It is not totally new that the artist interacts with the medium (canvas plus brush and paint, or musical instrument). So, the very fact of interaction is not new, but the level on which it takes place is, indeed.

"I don't see the 'binary architecture' as particularly relevant. Relevant is the discreetness. It remains to be seen if those 'unattainable design propositions' are also worthwhile.

"Earlier forms of aesthetic processes between 'artist' and 'audience' knew very well of 'participation' and interactivity (think of folk forms of art). They are largely neglected or ignored when one views the intervening of the computer as a substantial change. It is a change only when the prevelent aesthetic culture is taken as the base.'

Question 1 - Response to Remark #2:

"There appears to be some truth in the remarks above. I don't believe, however, that changes will be as profound and dramatical as indicated. Why should a technique have such an extreme influence on the perception and appreciation of works of art? Their perception and appreciation are much more influenced by the social environment, by the state of society and mankind than by a technique.

"In order not to be mistaken, the technique does have an influence. but the technique is itself a child of its time rather than the other way around. Or, even better, both influence each other mutually, but the technique is not the driving factor. The more visual imagery will be disseminated the more boring it will become. Few people will even pause and investigate an image visually.

"Large scale networking will definitely 'modify our perception.' Leave it as unspecific as it stands, it is just trivial Not the modification as such is of any interest but the direction it takes."

Question 1 - Response to Remark #3:

"I do hope we can prevent such a state of eternal boredom."

Question 2 - Response to Remark #1:

"I believe this is true."

Question 2 - Response to Remark #2:

"Agree! And add; the questions put forward above in order to evaluate art are intrinsically dialectic. That is to say, they don't result in any fixed, static set of criteria. They rather take society as it is and as it develops as the starting and end point of aesthetic creation and evaluation."

Question 2 - Response to Remark #3:

"Okay!"

Lillian Schwartz:

Question 1 - Response to Remark #1:

"Yes, the interactivity between the artist and computer is a significant development relative to artistic endeavor but not the interactivity between viewer and art.

"True, this technology yields increased numbers of design propositions which will affect resulting art. But I have doubts that the interactivity will substantially alter the concepts of 'artist' and 'audience.'"

Question 1 - Response to Remark #2:

"As an instrument of dissemination, possibly. It will change our present aesthetic criteria, but dramatically? How much? Criteria may then be different...but what a grand statement!"

Question 1 - Response to Remark #3:

"I have my doubts concerning the 'art of computer as artificial intelligence.' As to changing environment and resultant self-modification of aesthetics, this always has happened, in some ways, with the advent of new media. I suppose Harold Cohen is best for this answer at this time."

Question 2 - Response to Remark #1:

"Something has been established by Siggraph people, but who are those people and what are their backgrounds? The art world hasn't contributed to any significant degree that I know of. Video or filmmaking with and without the computer is different. The computer's use in these media plays a bigger role."

Question 2 - Response to Remark #2:

"Even traditional aesthetic criteria continue to change and alternate with time. As I mentioned in Phase One, the work of Fantin LaTour was kept in the vaults of the Metropolitan Museum for many years. Now, it hangs prominently and is highly respected...currently."

Question 2 - Response to Remark #3:

"For now, whoever does the judging sets the criteria, mostly based on technique rather than subject matter."

Gene Youngblood:

Question 1 - Response to Remark #1:

"As a result, the ultimate significance of this technology is extra-aesthetic and supra-cultural. It is a 'technology of the self' with profound ontological, existential implications."

Question 1 - Response to Remark #2:

"As a result, there will arise a widespread recognition that we live in a 'domain of representations' or a virtual reality of simulations. Thus: image politics, image wars...the politics of what can and cannot be simulated, verified, invoked."

Question 1 - Response to Remark #3:

"The result of the new 'scientific aesthetics' will not be a diminished value of traditional human/intuitive process but, rather, a new religious/spiritual era as we are forced to recognize, through machine intelligence, the universality of 'mind in nature.'"

Question 2 - Response to remark #1:

"Since the computer is a virtual instrument, any 'aesthetics' applied to its operation must necessarily be those already derived from the media and/or processes that the computer may become, i.e.,painting, music,logical discourse, poetry. 'Computer art' as such doesn't exist except as a substratum for simulations and virtual spaces."

Question 2 - Response to Remark #2:

"No comment."

Question 2 - Response to Remark #3:

"No comment."

Review of Charles Csuri's Phase Two Responses

As to the first of the three remarks pertinent to question one, Professor Csuri remains unconvinced that the consequences of interactivity provide any dramatically new perceptions through experiencing computer art. Though suggesting the possibility that this feature might require alterations to existing criteria, Csuri points to the processes of interactivity already available through through traditional artistic endeavors. Accordingly, and regardless of such conditions, his focus is on the intent of art, not in its technical facets.

Responding to the comments on the ramifications of large scale image dissemination, Csuri forsees a possible change in aesthetic perceptions brought on by its development, but suspects that, unfortunately, a blasé attitude toward such imagery would soon be forthcoming.

Posed with the concept of artificial intelligence in the role of aesthetic creator, his reaction is an adament rejection of such a notion.

Addressing the second question's remarks, Csuri is clearly in agreement with all three statements put forth.

Review of Frank Dietrich's Phase Two Responses

About question one's first remarks, Frank Dietrich expresses some concern to the particular grouping of individual attributes prescribed to by the context of the remarks. However, though the separate functions, in Dietrich's viewpoint, may not all relate equally to the processes of interactivity, he does credit these unique distinctions as being significant factors in the final examination of this art form. He is also of the opinion that the qualities listed in the remarks require more in-depth analysis before assuming their ultimate significance to the issue of aesthetic re-evaluation.

Dietrich views the dissemination issue as, perhaps, having more complex ramifications than the remarks might initially suggest. As all modes of visual communication are incorporated into the massive networking of this imagery, Dietrich feels that visual perception itself passes through numerous altered states of expression, along a progression of time and events.

In response to the proposition of computer art via artificial intelligence, it appears that Dietrich would agree with the prospect, but with qualifications. He is not comfortable with a "scientific" interpretation of aesthetic intelligence, preferring, instead, a

concept of a machine with simulated artistic understanding which would utilize a "fuzzy logic," or humanistic approach to the creative task. Such logic invokes patterns of procedure not so methodical or direct as might normally be applied to digital imaging practices.

Regarding the second question and ensuing remarks, Dietrich holds varying opinions of the applied rationales. He expresses regret that, due to an over-reliance of presently accepted visual formalities, successful computer art has understandably emphasized their benefits. Unfortunately, he feels that such practices have forfeited new found aesthetic conventions which may have been gained from intelligent explorations and applications of the inherent dynamics of this medium.

Responding to the second remark, Dietrich agrees that the stated considerations should apply to computer generated art as well as the more traditional aesthetic pursuits. He does, however, take exception to the combining of the noted concerns as equally applicable to the matters of evaluation.

In response to the last remark, Dietrich strongly disagrees with what he perceives as after-the-fact resolution to the issues of computer aesthetics. To rely on present guidelines so long as no tangible evidence promotes consideration of new criteria, in Dietrich's estimation, would be to ignore the obvious, if yet unclear, potential

of this art form. Intelligent speculation, in his opinion, can only enhance our present understanding of the ongoing efforts and developments within the realm of computer aesthetics.

Review of Hiroshi Kawano's Phase Two Responses

The commentary of Hiroshi Kawano about the remarks from Phase Two's questions can be summarized quite succintly, with no need for further elaboration. He is in basic disagreement with all three statements concerning the unique aspects of computer art and their affect on traditional aesthetic criteria. He does agree with the remaining three remarks relating to the adequecy of traditional aesthetic criteria applied to computer art.

Review of Monique Nahas' Phase Two Responses

The qualities of interactivity, for Monique Nahas, are not the exclusive justification for final recognition of computer art as a unique art form. She refers to this capability as an instrumentation rather than an intrinsic aptitude of the creative process. The artist, as well as the audience, in her opinion, are still the ultimate perceivers of whether resulting pieces merit consideration as distinguishable works of art.

With the conditions of networking and the dissemination of art, Nahas concedes only to the possibility of changed aesthetic perceptions about the imagery involved. Television, she detects, is already a proven example of such practiced visual expression. Furthermore, she raises the issue of whether or not the consequential changes in aesthetic perception would be of a beneficial nature. For, with widespread dissemination and exploration of art images, a thinning of established criteria as a result of that dispersal is a real possibility.

Nahas views the involvement of artificial intelligence within the creative processes to be as limiting as it may be de-limiting. If the computer can be taught set principles of creativity, how then will such a machine progress, as would the artist, toward unexplored or unexpected terrain? According to her way of thinking, such questions have yet to be explained.

She does not necessarily believe that the fundamentals of traditional criteria are, in all cases, bolstered by the aesthetic endeavors of computer art. Quite often the opposite is true. Adherence to and separation from these formalities can both be acceptable approaches to artistic expression.

Nahas agrees, basically, with the remarks concerning the appropriateness of the fundemental questions which must be applied to all the arts. However, she does not feel that any work of art is ever totally unconnected from the means by which it is produced.

In consideration of present criteria being sufficient to the evaluation of computer art, she is agreeable to such a condition, but only if that existing criteria can accomodate unexpected, intuitive developments.

Review of Mihai Nadin's Phase Two Responses

Mihai Nadin is in partial agreement in responding to the remarks concerning the interactivity issue. The artist's involvement with his work has always been a highly interactive mode, according to Nadin, the computer adding little to alter this condition. What is new and unique, he feels, is the increased role of the viewer as an interactive participant and perceiver.

There is full agreement to the comments involving the dissemination of art, However, Nadin rejects the premise that traditional values would be superceded by the aesthetics of artificial intelligence. Acknowledging the inescapable fact that traditional criteria contribute to any newer art form, Nadin maintains that there is an historical connection from past to future which remains unbroken, regardless of suggestions to the contrary.

As to the remaining three commentaries in reply to the second question, Nadin is in full agreement with all the remarks, as stated.

Review of Frieder Nake's Phase Two Responses

Frieder Nake expresses general agreement with the first statement, but explains that his opinion is based largely on the level of interactivity in which computer art may engage. Contingent upon prevailing aesthetic sensibilities, Nake notes that the interactivity issue is one of degree; that what is conceivably unique about computer art is the increased influence of the interactive processes between the artist and the audience, beyond that of traditional art forms.

His response to the concept of changed perspectives, due to the dissemination factor, is supportive to a degree. In qualifying his approval, Nake points to the many other factors which play a larger part in shaping our aesthetic perceptions, those of a social and cultural nature. These influences, he feels, are the significant precipitants which, intensified through the dispersal of art via networking, will modify the way we view all art.

Regarding the issues surrounding artificial intelligence applied to the creative processes, it would seem from Nake's brief comment, that he resists the suggestion as an ill-fated endeavor.

Agreement about the remaining remarks relative to question two has been reached.

Review of Lillian Schwartz' Phase Two Responses

Like Mihai Nadin's opinions on the interactivity comments, Lillian Schwartz holds opposing points of view about the remarks. However, her reasons are a reversal of Nadin's, as she claims that the interactive relationship between the artist and his art is the significant development which might alter our present perspectives of such works. The relationship between viewer and art, Schwartz infers, is of lesser consequence.

Schwartz questions the degree to which dissemination might actually affect aesthetic criteria but admits to the outside possibility of some changes due to that effect.

She is unsure that artificial intelligence will offer any new or unique conditions which would be very different from the normal routines of aesthetic developments.

Regarding the remarks about the question of the relevence of traditional criteria for evaluating computer art, Schwartz could not concur with the rationale behind those remarks.

Any re-affirmation of fundamental criteria should come from a consensus of endeavors originating in the art community which, she feels, has not necessarily been the case to this point.

Responding to the second and third remarks, she indicates that perhaps too much faith is placed on even the most basic premises of traditional evaluation. Schwartz notes that a history of opinion reversals precludes definitive judgements and that, in the final analysis, such evaluation is an individualistic procedure.

Review of Gene Youngblood's Phase Two Responses

Youngblood, in agreement with the premise of interactivity as a uniquely qualifying attribute of computer art, claims that the consequences of this applied characteristic are of a metaphysical nature in the development of new aesthetic perceptions.

Concurring with the implications of dissemination, he extrapolates toward a cultural awareness of society's penchant for image idolatry in the telecommunication of information.

As for abandoning traditional aesthetics for a newer scientific aesthetics of artificial intelligence, Youngblood feels that such a development would act, beneficially, as a congealing agent toward a cosmic understanding of the creative spirit.

He is in agreement with all remarks associated with the question of the appropriateness of traditional criteria applied to the evaluation of computer art. As a cyclical process, according to Youngblood, the basic principles of aesthetic evaluation, whose origins are of traditional mediums, must obviously apply to computer art, which itself attempts to synthesize previously established art forms.

Regarding the remaining remarks, Youngblood has answered with a "no comment" response. This is interpreted as agreement with the statements, with no need for further deliberation on his part. Youngblood's previous responses from Phase One are already consistent with these remarks.

CHAPTER FIVE

Phase Two Results and Conclusions

To more completely appreciate the results of this next stage of the research it would be circumspect to review phase one's response chart, (near the end of chapter three), to re-examine the correlating viewpoints which are more thoroughly investigated in this second phase of the study. At that point, three developing currents of thought had clearly emerged. Those initial insights were:

1.) a general resistance about computer art as a new art form

2.) a divergence of opinion about the unique qualities of computer art which might supplant traditional aesthetics

3.) a general concurrence about traditional aesthetic criteria being adequate for the evaluation of computer art

Derivations of these emerging views can be interpreted thus:

1.) reactions to inquiry about whether computer art is a new art form or not

2.) reactions to inquiry supporting a premise of computer art as a new art form

3.) reactions to inquiry supporting a premise of computer art as a traditional art form

The first of the above points addresses the prime issue of this research; the second and third points investigate arguments on either side of that issue. The strategy of phase two was intended to precipitate more conclusive testimony with respect to those arguments.

The rationales elicited from the second phase often reflect reasoning exhibited in phase one's responses. This is particularly true with those respondents who had previously addressed conditions that are now being re-considered in the framework of the phase two questionnaire. Consequently, there are no dramatic alterations of prevailing attitudes evident in the responses generated during phase two. However, beyond the general levels of agreement or disagreement to the remarks, phase two provides an increased understanding of those opinions, due to the more distinct propositions furnished to the respondents.

Prior to phase two there existed a general attitude of judgment endorsing traditional aesthetic criteria as suitable for the evaluation of computer generated art. This condition is re-affirmed here and to a

greater degree than before. Given the three separate rationales which supported traditional aesthetics, no less than five of the eight participants were, at all times, in agreement with the remarks. This represents a consensus of opinion on the issues of functionalism about traditional aesthetics and criteria applied to the assessment of digital art. The dissenting faction within the group, it should be noted, holds the view that criteria in general are transitory and often shortsighted, therefore of dubious distinction to a lasting evaluation of any form of art.

Phase one results indicated that the question (about the unique characteristics inherent to computer art) elicited few mutually agreed upon viewpoints. Examination of those views suggests that some concern over the premise may have been induced by the inferrence that acknowledgement of such innovation was conditional to abandoning traditional aesthetic criteria.

In phase two, however, the responses to the remarks surrounding this issue are more attentive to discussing such unique qualities as suggested in those remarks. While no overall consensus of opinion can be ascertained about the matter, the study observes individual shifts in attitude toward an acceptance of innovation. If there is a hidden quorum here, it may be the commonly held belief that, regardless of innovative properties which may or may not require new aesthetic models about computer imaging, traditional criteria remain an integral part of the aesthetic evaluation of this art form.

Concerning the varying levels of interactivity as unique traits of digital art, the opinions expressed are the most diverse. Some participants agreed with the remarks expressed on the subject while others rejected the reasoning behind the remarks. Certain respondents refrained from definitive commitment and particular individuals could only partially endorse the proposition put forth.

The interactivity factor is, perhaps, the more complicated issue dealing with innovation in computer art. As a function of art, interactivity is not, in itself, unique. Participants have acknowledged the historical evidence of this fact in their discourse. Its qualification as an innovation must, therefore, be based on a measurable change of its previous affect upon the processes and products of art. It is apparent from the respondents' deliberations over this matter that the extent to which computer interactivity significantly alters that effect is not clear.

The responses to the comments about changed aesthetic perceptions (due to the consequences of mass dissemination of visual imagery) are less divergent here and favor a compliance with the suggestions of those remarks. Half of the participants are in full agreement, or nearly full agreement, with the premise as stated and three more concede to the possibility of this condition. Only one of the eight respondents has expressed a dissenting opinion about the remarks.

Acknowledging the function of dissemination as an agent of changing aesthetic values is a marked development in the findings of this investigation. This is so, not only because of the number of participants who have considered its ramifications, but also due to the fact that these consequences have not yet been realized. The scope of such networking, with an applied emphasis on the visual communication and exploration of material, is still a future development, though a very real probability. That the respondents have shown a willingness, on behalf of these issues, to pre-determine potential aesthetic developments, prior to their inception, is of significant interest.

On the subject of artificial intelligence as a creative process of visual expression, the majority of participants have clearly stated that such a development would be of little consequence toward abandonment of traditional criteria in favor of new-found aesthetic perspectives. Certain respondents have suggested that A.I., applied to the task of creative imaging, might yield, as a side benefit, a clearer insight and understanding of our own human aesthetic perceptions and processes. Hiroshi Kawano, a strong proponent of A.I. in the field of aesthetic pursuit, claims that his concept of "scientific aesthetics" is founded on the fundamental principles of traditional aesthetics and their criteria.

Generally, it is assumed that the progression of artificial intelligence has far to go if it is to advance to a point where it might seriously assume the responsibilities of artistic expression.

The graphic response chart on the following pages, phase two's overview of participants' evaluations, illustrates the prevailing attitudes about the issues. The chart is divided into two parts. The first page represents the respondents' reactions to the remarks of question one. The second page represents the respondents' reactions to the remarks of question two.

To recapitulate, charting the prevailing attitudes of participants in this manner is exclusive of the various rationales employed in their development. Where general agreement or disagreement of sentiment may appear evident by this chart, the rationales behind the individual positions do not always concur, as the reviews of the participants' responses has indicated.

PHASE TWO RESPONSE CHART

* What is unique about computer art that renders traditional aesthetics obsolete?

Comment #1: (INTERACTIVITY)

DISAGREE	MAYBE	AGREE
Kawano	Csuri	Youngblood
Nahas	Dietrich	Nake
(Schwartz)		(Schwartz)
(Nadin)		(Nadin)

Comment #2: (DISSEMINATION OF ART)

DISAGREE	MAYBE	AGREE
Kawano	Schwartz	Youngblood
	Nahas	Dietrich
	Csuri	Nadin
		Nake

Comment #3: (A.I. WILL CHANGE TRADITIONAL AESTHETICS)

DISAGREE	MAYBE	AGREE
Kawano	Nahas	
Youngblood		
Nadin	Schwartz	Dietrich
Csuri	Nake	

Figure 4.

Figure 4. (continued)

* Are there traditional aesthetic criteria which are adequate for evaluating the quality of computer art?

Comment #1: (VISUAL BASICS OF HARMONY, SYMMETRY, BALANCE)

DISAGREE	MAYBE	AGREE
Schwartz		Kawano
	Dietrich	Youngblood
Nahas		Nake
		Nadin
		Csuri

Comment #2: (ROOTS IN TRADITIONAL FINE ARTS CONSIDERATIONS)

DISAGREE	MAYBE	AGREE
Schwartz		Kawano
		Dietrich
		Youngblood
		Nake
		Nadin
	Nahas	Csuri

Comment #3: (COMPUTER ART HAS NOT ELICITED NEED FOR NEW AESTHETICS)

DISAGREE	MAYBE	AGREE
Dietrich		Kawano
Schwartz	Nahas	Nake
		Youngblood
		Nadin
		Csuri

It can be concluded, from the views of the participants and the chart's summary of those views, that, while there is not a general consensus of opinion about the issues of innovation, isolated occurences of consensus regarding particular innovative qualities have been determined. There are areas of disagreement about individual premises which suggest, at this point, little hope for further progress toward convergence of opinion about those matters.

An underlying theme observed throughout much of the debate has been to emphasize the processes of creative endeavor, particularly when referring to the unique manifestations of computer art. Evident from many of the remarks elicited is a willingness, on the part of the respondents, to refer to the processes of computer generated art as correlating directly with the criteria by which its aesthetic worth can be measured. The classic argument that a work of art must be viewed as an isolated product from the procedures of its invention is of diminished importance when considering the newer issues of digital aesthetics.

Beyond the significance of any "consensus doctorum" which can be realized from this investigative survey are the valuable insights and learned counsel which have resulted from its application. The astute remarks and intuitive speculation elicited from such knowledgeable sources may serve as standing and future guidelines for furthering our

understanding of the continuing progress of computer generated art. As technical and intellectual advancements in this field pursue their due course, and challenge the structure of traditional aesthetic perceptions, a clearly focused perspective of those developments will demand further investigations concerning their relative significance to the ongoing pursuits of aesthetic achievement.

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